DOCUMENT RESUME

ED 259 255 CG 018 356

AUTHOR Slife, Brent D.
TITLE Depression and Metacognitive Skill in Problem Solving.
PUB DATE Apr 85
NOTE 14p.; Paper presented at the Annual Convention of the Southwestern Psychological Association (31st, Austin, TX, April 18-20, 1985).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cognitive Ability; College Students; *Depression (Psychology); Higher Education; *Metacognition; *Self Evaluation (Individuals)
IDENTIFIERS *Self Monitoring

ABSTRACT

The ability to stand back from oneself and reflect on one's behavior and thought processes has long been considered crucial to the therapy process. Many therapies explicitly require patients to monitor their behaviors and thoughts. This self-monitoring requires considerable metacognitive skill on the part of the patient. Some therapies for the treatment of depression rely on the patient's metacognitive skills, although there is no clear evidence that depressives possess such skills. Two studies were conducted which investigated the relationship among depression, two types of metacognitive skill, and cognitive skill. The first study experimentally manipulated depression in 40 college students with a Velten procedure to examine depression effects on three skills: the ability to estimate the solutions to math problems (cognitive skill); the ability to accurately predict one's ability to estimate the solutions (metacognitive knowledge about cognition); and the ability to accurately rate one's performance after estimating the solutions (metacognitive monitoring of cognitive performance). The second study measured these skills in 48 college students with severe, mild, or no depression. The results for both studies indicated that depressed subjects were less skillful than nondepressed subjects in both types of metacognitive abilities. These differences were found to be unrelated to response bias and not significantly correlated to cognitive skill. (Author/NRB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED2592555

BEST COPY AVAILABLE

Depression and Metacognitive Skill in Problem Solving

Brent D. Slife

Baylor University

CG 018356

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

[X] This document has been reproduced as received from the person or organization originating it.

[ ] Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Brent D. Slife

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Abstract

Two studies are reported that investigate the relation between depression, two types of metacognitive skill, and cognitive skill. Study #1 experimentally manipulated depression in 40 college students with a Velten procedure to examine its effects on three skills: the ability to estimate the solutions to math problems (cognitive skill), the ability to accurately predict one's ability to estimate the solutions (metacognitive knowledge about cognition), and the ability to accurately rate one's performance after estimating the solutions (metacognitive monitoring of cognitive performance). Study #2 measured these skills in 48 college students with severe, mild, and no depression. As predicted, the results of both studies indicated that depressed subjects were less skillful than nondepressed subjects on both types of metacognitive abilities. Also as predicted, these differences in metacognitive skills were unrelated to response bias and not significantly correlated to cognitive skill. The importance of metacognitive factors that are separate from cognitive factors in depression is discussed.

Depression and Metacognitive Skill in Problem Solving

The ability to "stand back" from oneself and reflect on one's behavior and thought processes has long been considered crucial to the therapy process (e.g., Freud, 1960; Yalom, 1975). Many therapies now explicitly require the monitoring of behaviors and thoughts. Therapies for the treatment of depression are no exception. Rehm's (1979) self-control approach depends heavily upon the patients' ability to monitor their behaviors and reinforcements. Cognitive therapies also (e.g., Beck, 1979) depend upon the patients' skills in monitoring thoughts and feelings.

These skills are sometimes referred to as "metacognitive" skills because they involve processes "above" or "meta" to cognition. Rather than involving processes of thinking and feeling, metacognition involves processes of thinking about thinking and feeling about feeling. The therapies cited above appear to presume that depressives have these abilities. Considerable metacognitive skill is required to participate fully in these treatments, yet there is no evidence that depressives possess this skill.

The objective of the present investigation was to test whether depressives have metacognitive skills in problem solving. A deficit in these skills may decrease the effectiveness of many treatments for depression. Recent studies of learning disabled children have shown that the lack of metacognitive skills contributed to many types of cognitive

deficiencies (e.g., Brown, 1982). In addition, cognitive and metacognitive skills have been demonstrated to be separate sets of abilities (Slife, in press). The fostering of skills in one area does not automatically lead to skills in the other. This implies that socalled "cognitive" therapy strategies may not ameliorate metacognitive problems and may be less effective as a result. Metacognitive skill may be an individual difference dimension indicative of patients who are likely to benefit from these strategies. Moreover, a deficit in the ability to monitor one's thoughts or behaviors may be a contributor to the cognitive and behavioral problems that develop depression.

The present investigation examined two types of metacognitive skills in problem solving, knowledge of problem solving skills and the monitoring of problem solving performance (Brown & DeLoache, 1978; Slife, in press). Both types and cognitive skill were examined in two studies. The first study was a highly controlled test of the effects of experimentally induced depression on these skills. The second study measured these skills in persons with different levels of naturally occurring depression. Together, the two investigations provided a rigorous, yet ecologically valid examination of the metacognitive skill of depressives. The primary hypothesis was that depressives would evidence a deficiency in both forms of this skill.

Experiment 1

Method

Forty female college students were recruited as subjects

because the Velten (1968) mood induction procedure has been shown to be more effective with this population (Natale, 1977). Subjects were randomly assigned to either a depressed or a happy group, and administered the procedure individually. This consisted of reading aloud and silently 60 statements that have been shown to progressively facilitate the required mood for approximately ten minutes (Frost & Green, 1982; Teasdale & Fogarty, 1979). In order to measure "knowledge of problem solving skills," subjects were then shown a list of 20 math problems (e.g., 75 x 45) for 20 seconds, and asked to predict how many problems they would answer within 10% of error. Next, cognitive skill was measured by presenting each of the problems on a card, and asking each subject to estimate their answers. An estimation procedure was used as the problem solving task because of its flexibility with differing subject abilities in mathematics. A tape recorder was used to cue 12 second intervals for studying the problems and 5 second intervals for recording the estimates. The final factor was the ability to "monitor problem solving performance." This was measured by presenting the problems again, and asking subjects to rate on a 1 to 5 scale how accurate each of their estimates were. Five seconds was permitted for study and 3 seconds for rating.

Results and Discussion

Three dependent variables were measured: the prediction of the number of problems within 10% error, the error of the estimates, and the rating of estimate accuracy. To analyze cognitive skill, the mean percentage of error was computed for

each subject. A t-test comparing the depressed and happy group means was not significant. This suggests that the two groups were of comparable cognitive ability on the task (see Table 1 for means).

Insert Table 1 about here

Metacognitive skill was the association between each of the other two measures and cognitive skill, i.e., the accuracy of the predictions and ratings in relation to the error of estimate. The accuracy of the predictions was obtained by computing the absolute difference between the predictions of each subject and the actual number of estimates within 10% of error. A t-test was then performed comparing these differences for each group. As hypothesized, the predictions of the depressed group were significantly less accurate than those of the happy group (see Table 1 for means). The second analysis computed Pearson r correlations between the rating and percentage of error across problems for each subject. Thus, each coefficient was a measure of metacognitive skill for that particular subject. These coefficients were transformed into Fisher's z statistic in order to meet the assumptions of a t-test analysis (Kirk, personal communication, November, 1984). As predicted, the depressed group rated their estimates significantly less accurately than the happy group did (see Table 1 for means).

These results suggest that depression does affect one's

metacognitive skill in problem solving, though not necessarily one's cognitive skill. They also question whether depressives have the needed monitoring abilities to participate fully in many types of therapies. Before such conclusions can be given much credence, however, analogous metacognitive deficits should be demonstrated in persons with naturally occurring depression. This was the purpose of the second experiment.

Experiment 2

Method

Forty-five college students of both sexes were recruited as subjects on the basis of their scores on the Beck Depression Inventory (BDI; Beck, 1965). Beck's norms were used to differentiate these subjects into severe, mild, and no depression categories. Six males and nine females were considered severely depressed (>20 on the BDI), seven males and eight females were considered mildly depressed (>11 and <17 on BDI), and eight males and seven females were considered to be within normal range (<3 on the BDI). The BDI has been shown to be highly predictive of Research Diagnostic Criteria (i.e., major and minor depression) (Gallagher & Thompson, 1982). To ensure that these subjects met these criteria, however, four subjects from each of the severely and mildly depressed categories were randomly selected for structured SADS interviews (Endicott & Spitzer, 1978). All eight subjects met the RDC for their respective diagnosis.

Each of the subjects were given the prediction, estimation, and rating tasks described in Experiment 1 above. These tasks

were administered in a double-blind procedure in which the experimenter and subject were "blind" as to the subject's diagnosis. Care was taken to direct subjects to health-care facilities when appropriate.

Results and Discussion

The dependent variables of this investigation were identical to those of Experiment 1 and were computed in the same manner. All three variables were analyzed by a 2(sex) x 3(level of depression) between-subjects, factorial ANOVA for unequal *n*. In the case of the cognitive skill factor, estimate error, only a main effect for level of depression reached significance. Further Scheffe' tests revealed that the severe group performed the most poorly, and the mild and no depression groups did not significantly differ (see Table 2 for means).

Insert Table 2 about here

This analysis was performed on the rating factor (after correlation with estimate error and convertion to Fisher's *z* statistic as in Experiment 1). Only the main effect for level of depression was significant, with Scheffe' tests showing the least accurate group to be the severely depressed, followed by the mildly depressed, and then no depression group (see Table 2 for means). An identical analysis was performed on the absolute difference between each subject's prediction and the actual number of estimates within 10% of error. A similar pattern of results was revealed, with the severely depressed group being

the least predictive, followed by the mildly and then no depression groups (see Table 2 for means).

These results replicate those of Experiment 1 and generalize the findings to naturally occurring depression. Both mild and severe depressives were significantly less metacognitively skillful than subjects with no depression. In addition, cognitive and metacognitive skills were uncorrelated until the severe level of depression. That is, mild levels of depression (in both studies) showed metacognitive but not cognitive deficits, ruling out cognitive deficits as the cause of the metacognitive deficits. Indeed, if severe depression follows mild depression (Rush, 1983), metacognitive deficits precede and perhaps contribute to cognitive deficits. Results also suggest that therapists cannot assume that depressives have the monitoring skills required for many therapies. The present study, however, examined only general problem solving skills in this light. Future studies will need to examine monitoring skills more specific to particular therapies.

Table 1

Mean of Depressed and Happy Groups for Cognitive and Two Types of Metacognitive Skill

	Type of Skill		
Type of group	Cognitive (% error)	Prediction (minus actual)	Rating (Fisher's z)
Depressed	36.37	7.79*	-.088*
Happy	35.07	3.45	-.439

*Significantly different ($p < .01$) from mean of group below

Table 2

Mean of Severe, Mild, and No Depression Groups for Cognitive and Two Types of Metacognitive Skill

	Type of Skill		
Type of Group	Cognitive (% error)	Prediction (minus actual)	Rating (Fisher's z)
Severely Depressed	95.75*	8.35*	.173*
Mildly Depressed	44.72	6.11*	-.153*
No Depression	36.14	3.21	-.494

*Significantly different ($p<.01$) from mean of group below

References

Beck, A. T., Ward, C. H., Mendelson, M., Mock, J. E., & Erbaugh, J. (1961). An inventory for measuring depression. Archives of General Psychiatry, 4, 53-63.

Beck, A. T., Rush, J., Shaw, B., & Emery, G. (1979). Cognitive therapy of depression. New York: Guilford.

Brown, A. L., & DeLoache, J. S. (1978). Skills, plans, and self-regulation. In R. S. Seigler (Ed.). Children's thinking: what develops? Hillsdale, NJ: Erlbaum.

Brown, A. L., & Palinscar, A. S. (1982). Inducing strategic learning from texts by means of informed, self-control training. Topics in Learning and Learning Disabilities, 2, 1-17.

Endicott, J., & Spitzer, R. L. (1978). A diagnostic interview for affective disorders and schizophrenia. Archives of General Psychiatry, 35, 837-844.

Freud, S. (1960). Letters of Sigmund Freud (edited by E. L. Freud). New York: Basic Bookds, Inc.

Frost, R. O., & Green, M. L. (1982). Velten mood induction procedure effects: Duration and postexperimental removal. Personality and Social Psychology Bulletin, 8, 341-347.

Gallagher, D., Breckenridge, J., Steinmetz, J., & Thompson, L. W. (1983). The Beck Depression Inventory and Research Diagnostic Criteria: Congruence in an older population. Journal of Consulting and Clinical Psychology, 51, 945-946.

Natale, M. (1977). Effects of induced elation-depression on speeck in the initial interview. Journal of Consulting and Clinical Psychology, 45, 45-52.

Rehm, L. P. (1979) A self-control model of depression. Behavior Therapy, 8, 787-804.

Rush, J. (1983). Short-term therapies for depression. New York: Guilford.

Slife, B. D., Weiss, J., & Bell, T. (in press). The separability of metacognition and cognition: Problem solving in learning disabled and regular students. Journal of Educational Psychology.

Teasdale, J. D., Taylor, R., & Fogarty, S. J. (1980). Effects of induced elation-depression on the accessibility of memories of happy and unhappy experiences. Behavior Research and Therapy, 18, 339-346.

Velten, E. (1968). A laboratory task for induction of mood states. Behavior Research and Therapy, 6, 473-482.

Yalom, I. (1975). The theory and practice of group psychotherapy. 2nd Ed. New York: Basic Books.